

# Capsule-Preserving Approach to Arthroscopic Decompression of the Anterior Inferior Iliac Spine



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**Abstract:** Hip arthroscopy techniques have evolved to treat a wide range of extra-articular pathologies. Subspine impingement commonly occurs in femoroacetabular impingement, particularly in athletes with a high range of motion, patients with low degrees of femoral version, and those with large subspine deformities. A reliable technique that preserves the hip capsule would be helpful for hip arthroscopy surgeons. This note details our technique using pericapsular windows proximal to the interportal capsulotomy to access and decompress a subspine deformity in the setting of hip femoroacetabular impingement.

Subspine impingement (SSI) is a type of extra-articular hip impingement resulting from abnormal contact between the anterior inferior iliac spine (AIIS) and femoral neck or head-neck junction.<sup>1,2</sup> SSI commonly co-occurs with intra-articular femoroacetabular impingement (FAI), and successful identification and correction of a prominent subspine has been shown to be predictive of greater improvement after primary hip arthroscopy for FAI syndrome.<sup>3-5</sup>

Hetsroni et al.<sup>6</sup> defined 3 types of AIIS morphologies in SSI: type I, which appears radiographically normal and describes a smooth ileal wall between the AIIS and acetabular rim; type II, which extends to the level of the acetabular rim; and type III, which protrudes distal to the anterosuperior acetabular rim. When matched for

version and alpha angle, patients with type II and III SSI have progressively limited range of motion during hip flexion and internal rotation.<sup>6</sup>

Recent studies also have associated SSI with lower degrees of subspine deformity as a result of low femoral anteversion.<sup>7,8</sup> Athletes with a high range of motion, such as dancers, have also been identified as a group with a high incidence of SSI.<sup>9</sup> In other words, patients with high range of motion and low femoral version can have SSI with type I or II deformities. The purpose of this article is to detail our technique using a proximal pericapsular window to visualize and resect a protruding subspine.

## Surgical Technique (With Video Illustration)

### Preoperative Evaluation

The surgical technique was developed by the senior author (C.M.L.)<sup>10,11</sup> (Video 1). All patients should be worked up with 3-dimensional computed tomography (3D CT) analysis evaluating femoral version, and it should be recognized that decreasing amounts of femoral anteversion are associated with increasing amounts of extra-articular impingement in the subspine area even in type I and II deformities<sup>7</sup> (Fig 1).

### Subspine Decompression

A standard diagnostic arthroscopy should be carried out, and all intra-articular pathology should be treated including labral tears and chondral flaps. Immediately above the anterosuperior labrum between 1 and 3 o'clock is the most common area of AIIS (subspine) impingement, and this should be

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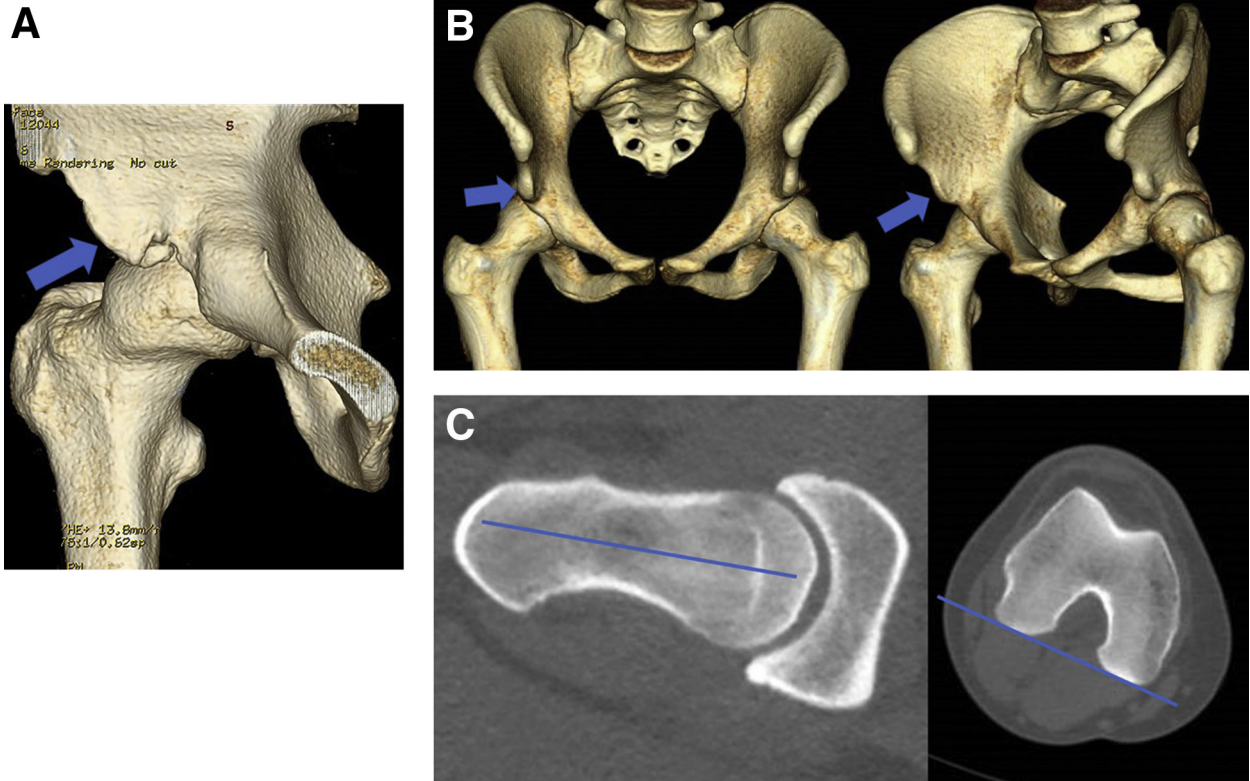
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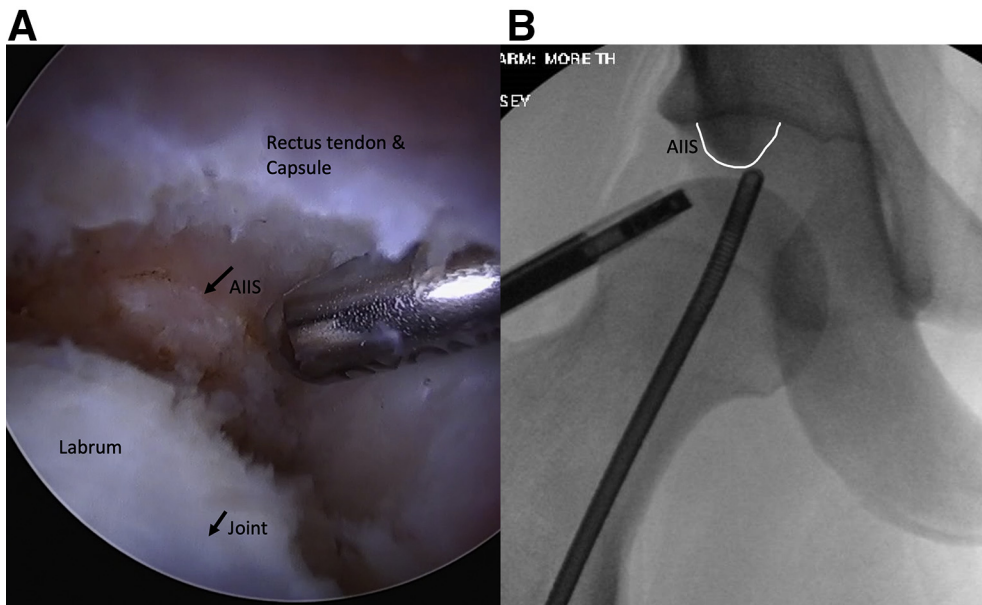
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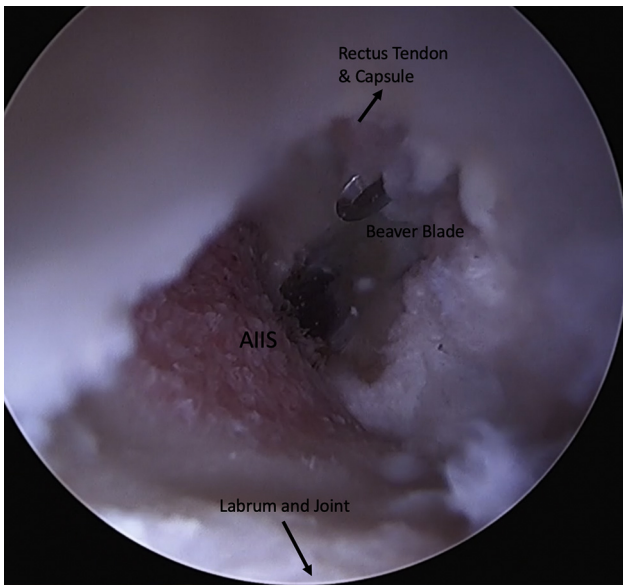
**Fig 1.** (A-B) Three-dimensional CT scans demonstrating type III AIIS deformity of the right hip. (C) Axial-oblique CT image of the right hip demonstrating low femoral anteversion of approximately 10°. (AIIS, anterior inferior iliac spine; CT, computed tomography.)

correlated with a fluoroscopic image and 3D CT scans (Fig 2). The base of the subspine at the level of the joint can be addressed from within the interportal

capsulotomy; however, to address the entirety of the subspine deformity without creating an inverted L capsulotomy or worse a capsular resection, a



**Fig 2.** The distal portion of the right AIIS seen through the interportal capsulotomy (A). The location of the AIIS is most commonly between 1 and 3 o'clock above the anterosuperior labrum, which can be correlated with a fluoroscopic image (B) during surgery. (AIIS, anterior inferior iliac spine.)



**Fig 3.** Arthroscopic visualization of the Beaver blade creating a small pericapsular window for proximal access to the right AIIS. (AIIS, anterior inferior iliac spine.)

pericapsular window can be created. A banana-style Beaver blade (Beaver-Visitec International, Waltham, MA) is slotted into the joint, and a new path through the rectus and proximal capsule is created under direct visualization (Fig 3). Through this path that was created with a beaver blade, the Slotted Cannula and Switching Stick (Smith & Nephew, Andover, MA) are placed. Then, the DYONICS Burr (Smith & Nephew) is taken apart and the sheath is placed over the switching stick followed by the inner burr component (Fig 4). Fluoroscopy is used to confirm proper placement and adequate subspine resection trough this window (Fig 5).

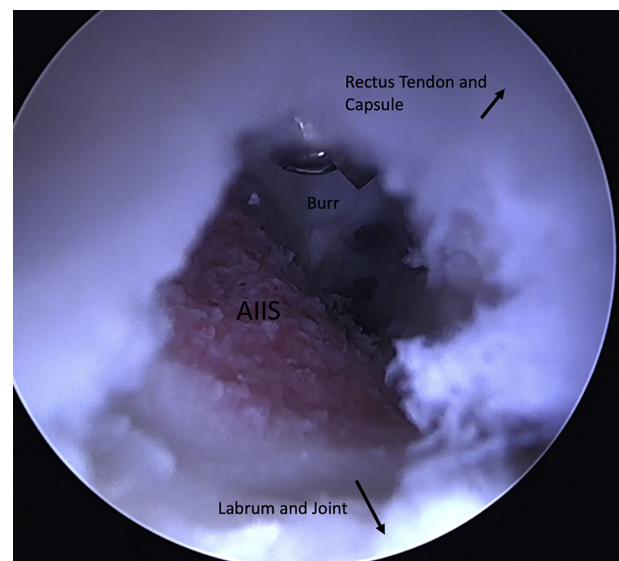
Adequate decompression can be confirmed with a false profile view by seeing the fluoroscopic image intensifier back 40°. Occasionally for avulsion type or large deformities, 2 or 3 pericapsular windows will be required to complete the subspine resection. On a well-aligned anteroposterior fluoroscope image, it is our preference to resect 2 burr-widths (>1 cm) proximal to the acetabular rim.

SSI should be assessed for and treated in athletes with high range of motion, cases of low femoral anteversion of less than 5°, or in cases of type II or III AIIS deformities. These small pericapsular windows preserve both the proximal capsule and interportal capsulotomy and leave adequate capsule to close or plicate without risking postoperative instability. The femoral head–neck offset or cam deformity can then be corrected through the interportal capsulotomy, and our preference is to close the interportal capsulotomy with 4 to 6 simple nonabsorbable stitches following comprehensive FAI correction.

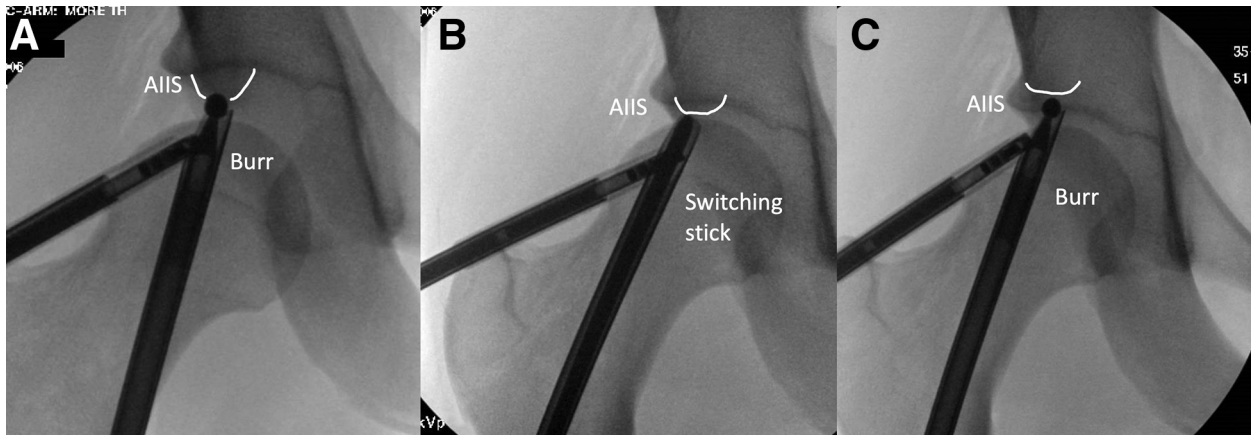
## Discussion

Extra-articular impingement is important to recognize, especially in patients with decreasing degrees of femoral anteversion.<sup>7,8</sup> Recently, Lerch et al.<sup>7</sup> used 3D CT to compare patients with symptomatic hips and low femoral version to asymptomatic patients with normal version to determine if hip impingement was intra- or extra-articular. Most patients had intra-articular disease, but one third of patients demonstrated both intra- and extra-articular SSI that increased with lower degrees of femoral version. Similarly, Aguilera et al.<sup>8</sup> used 3D CT and found SSI morphology present in 23.7% of patients (46/194 hips). Of those, more than 50% had type I AIIS morphology, and the median femoral version was 5.6° (range, 2.1°–7.5°). Therefore, suspicion of SSI and resection of a protruding AIIS are important for achieving optimal clinical outcomes in patients with low degrees of femoral anteversion (Figs 6 and 7).

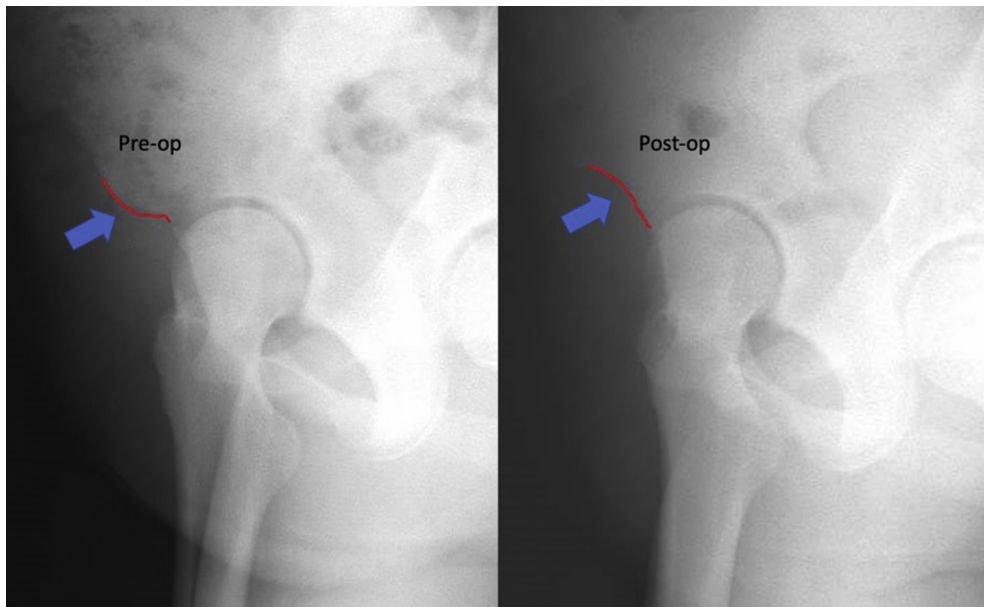
Table 1 lists some advantages and potential disadvantages of our technique. The pericapsular window created provides enough exposure to resect the subspine while preserving the proximal capsule without necessitating capsular repair to the subspine region. Care must be taken when creating the window to avoid connecting it with the interportal capsulotomy due to the risk of creating an L-type capsulotomy (Table 2). This technique preserves the capsule, which is advantageous in preventing postoperative instability. Studies indicate that complete capsular repair is associated with improved clinical outcomes and lower revision rates.<sup>12</sup>



**Fig 4.** Arthroscopic view of a burr shaving the proximal portion of the AIIS through a pericapsular window. (AIIS, anterior inferior iliac spine.)

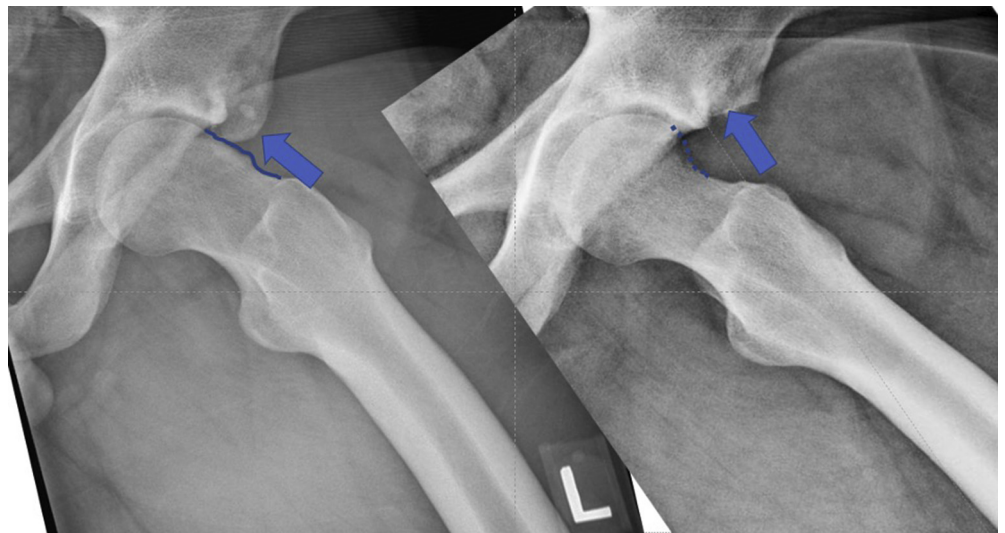


**Fig 5.** Sequential fluoroscopic images of the right hip which demonstrate (A) a burr accessing the distal portion of the AIIS through the interportal capsulotomy, (B) a slotted cannula and switching stick placed through the initial peri-capsular window, and (C) a burr shaving the proximal portion of the AIIS through a second window. (AISS, anterior inferior iliac spine.)



**Fig 6.** Pre- and postoperative false profile views of a type II subspine deformity of the right hip.

**Fig 7.** Pre- and postoperative left Dunn lateral views of a type III subspine deformity that was a result of a rectus avulsion.



**Table 1.** Advantages and Potential Disadvantages

Advantages
Preserve capsule for interportal closure
Adequate exposure and access to subspine region
Allows for proximal resection of the subspine without performing capsulectomy or inverted L type capsulotomy
Potential disadvantages
Learning curve
Visualization can be poor at the beginning during new technique adaption

The present technique does pose some risks. For instance, a window is being created in the direct head of the rectus tendon, and there is a risk of complete transection. It should be recognized that this insertion is broad, and the authors have not seen this occur in more than 1000 cases. Another risk is connecting the pericapsular window with the interportal capsulotomy. Surgeons should be prepared to close this inverted-T type capsulotomy at the completion of the case. The procedure should be used for type II and III AHS deformities, but it may have limitations when treating advanced heterotopic ossification or other complex osseous deformities.

In summary, we have presented a capsular-preserving technique of arthroscopic subspine resection. By creating pericapsular windows, we limit the amount of capsular disruption to preserve hip stability.

**Table 2.** Pearls and Pitfalls

Pearls
Learn to correlate anteroposterior fluoroscopy with false-profile view
Have assistant hold camera while you create pericapsular window and use both hands to maintain position and hold slotted cannula
Consider subspine resection in athletes with a high range of motion and cases of low femoral anteversion even in cases of small anterior inferior iliac spine deformities
If visualization or access is poor in traction, try letting traction down then re-entering the pericapsulotomy window for subspine access
Pitfalls
Try not to connect interportal capsulotomy with the window, or it can create inverted L-type capsulotomy
Under-resection due to poor visualization

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